TRANSLATION OF PCT/CH2004/00352

CASTING MACHINE

The invention is directed to a casting machine according to the preamble of the independent claims 1 and 4.

From WO 97/24200 a method and a device are known for controlling the movement of a foundry la1dle with a low casting height in a casting arrangement. This method and/or this device allows by purely mechanical means the performance of the tilting movement in an advantageous manner. However, the exchange of the empty foundry ladle for a foundry ladle filled with new melt is unpractical. Furthermore, the feeding of the foundry ladle to the casting boxes, which are usually guided along the casting arrangement on cars, must occur by a separate drive, i.e. on conveyers which run lateral to the drive path of the casting boxes. During tilting, the foundry ladle is guided on two parallel positioned curved paths; additionally it is suspended on both sides between the curved paths. This dual suspension complicates the exchange of the empty foundry ladle for a newly filled one quite considerably, because during the transfer of the foundry ladle the latter must be lifted out of the guides.

The objective of the present invention is to create a casting machine, by which the foundry ladle can be guided purely mechanically on curved paths and can optimally perform a tilting movement. Another objective of the invention comprises that the suspension of the foundry ladle is provided such that an easy exchange of the empty foundry ladle for a full one is enabled.

This objective is met through the features of claims 1 and 4.

By the unilateral suspension of the foundry ladle at a control cam using two pairs of roller paths, namely an interior one and an exterior one, it is achieved, on the one hand, placement of the foundry ladle on the floor and release of the foundry ladle from the suspension and/or the lifting of a foundry ladle filled with melt from said place into the

initial position for tilting, and, on the other hand, to perform the tilting movement such that the outflow can occur in a best possible manner. Furthermore, by linking a control cam to a vertically positioned rotational axis, the foundry ladle can be rotated together with the control cam around said axis and can be lowered for the transfer to a transportation device, which removes empty foundry ladles and feeds new ones. Additionally, performance of both the lifting and the lowering movement as well as the tilting movement by a single drive is also achieved.

Using an illustrated exemplary embodiment, the invention is explained in greater detail. In the drawings:

Figure 1a is a layout of a casting box conveyer having four casting boxes and a casting machine in the casting position and in the exchange position,

Figure 1b is a side view of a casting machine,

Figure 1c is a view of the casting machine from the front,

Figure 1d is a partial layout of the casting machine after the foundry ladle has swiveled out around the axis A,

Figure 2 is a side view of the control cam of the carrying car and the foundry ladle set down in front of it, in dot-dash lines, and in a raised position for the tilting movement,

Figure 3 is a perspective view of the control cam and of the foundry ladle suspended from the carrying car,

Figure 4 is a top view of the casting machine according to Figure 2,

Figure 5 is a side view of the control cam of the carrying car and the foundry ladle in front of it in a raised position and in a position at the beginning of the casting process, and

Figure 6 is a side view of the control cam of the carrying car and the foundry ladle in the position at the beginning of the casting process and in the position at the end of the casting process in a maximally tilted position.

In a schematic representation according to Figures 1a through 1d, a casting machine according to the invention is indicated with reference number 1, which is arranged in front of casting boxes 3. Several casting boxes 3 can be guided past the casting machine 1 on conveyers 5. The casting machine 1 can be locally fixed or preferably be movable on conveyers 7 as well, in the latter case in order to be able to follow the casting boxes during the casting process, for increasing productivity. Further, in Figures 1a and 1d, in dot-dash lines, the foundry ladle 9 is discernible in a swiveled position. In this position, the foundry ladle 9 can be set to the floor and removed by a transportation device. From this set down position, a new foundry ladle 9, i.e. one filled with new melt, can be accepted by the casting device 1. Further, in Figure 1d a pivotal axis A is discernible, which allows the pivoting of the foundry ladle 9 from the casting position into the set down and exchange position.

Based on the perspective representation in Figure 3, the primary parts of the casting machine 1 according to the invention are described. In the foreground, the foundry ladle 9 with the spout 11 and the spout stone 13 arranged therein are discernible. At both sides on the upper rim of the foundry ladle 9, receiving holders 15 with catching slots 17 are discernible. The receiving holders 15 serve to allow the transportation of the foundry ladle 9 via a transportation device. On the lateral surfaces of the foundry ladle 9, not discernible in Figure 3, holding devices 19 are mounted (compare Figure 4) here, from which the foundry ladle 9 can be suspended from a holding plate 21 on an carrying car 23. At the holding plate 21, the holding disks 20 are arranged, which engage the holding means 19 from the bottom.

The carrying car 23 comprises two pairs of rollers, namely an upper pair of rollers 25 and a lower pair of rollers 27. The upper pair of rollers 25 run on the upper roller path 29; the lower pair of rollers 27 runs on the lower roller path 31 (also compare Figure 2.) The upper roller path 29 is on an upper control cam 33; the lower roller path 31 on a lower control cam 35 (Figure 2.)

Based on Figures 2, 5, and 6, the movement process of the foundry ladle is described from the time of accepting a ladle filled with melt to the setting down of the emptied ladle 9. In Figure 2, in dot-dash lines, the ladle 9 is shown set down onto the floor 37. Also discernible from the same figure is the foundry ladle 9 raised by the distance z. Here, the lower pair of rollers 27 run along the linearly extending path sections 39 and the upper pair of rollers 25 along the upper, also linearly extending path sections 41. Both pairs of rollers 25, 27 are now located at the upper end of the linear path sections 39, 41, and run in two intermediate sections, namely an upper intermediate section 43 of the upper roller path 29 and a lower section 45 of the lower roller path 31. These two intermediate sections 43, 45 cause the lowering of the spout 11 by about the distance y and simultaneously displace the spout 11 by the distance x, due to the narrow radii embodied at the upper intermediate section 43, in particular. This leads to a displacement of the spout 11 from point C to point B (cf. figure 5).

After having passed through said intermediate sections 43, 45 the pairs of rollers 25, 27 continue to travel further on the above tilting roller path sections 47, 49, preferably comprising a constant radius, and pivot the foundry ladle 9 from a position shown at the bottom of Figure 6 to the position shown at the top of Figure 6. The tilting angle amounts to the angle alpha (Figure 6.) After having finished the filling process of a mold 3, the carrying car 23 with the foundry ladle 9 returns to the starting position and, after the forward movement of the casting box 3, a subsequent casting box is filled in the same manner.

As soon as the foundry ladle 9 is empty or the melt remaining in the foundry ladle 9 is insufficient for filling another mold in the casting box 3, the carrying car 23 returns to the starting position, subsequently the carrying car 23 pivots counter-clockwise around a vertical axis A by approx. 90° (cf. Figures 1a and 1d.) Now, the carrying car 23 with the empty foundry ladle 9 rolls downwards until the latter rests on the floor 37. By further lowering the carrying car 23, the holding disks 20 move out of the holding plate 21 so that the casting machine 1 can move forward and reverse on the conveyer 7 and can accept, lift, and pivot the next foundry ladle 9, filled with melt, and continue the casting

process. The set down, empty foundry ladle 9 is picked up by a transportation device, such as a forklift, crane, or the like, and is replaced by a new, filled foundry ladle 9.

The pivot axis A can support the control cams 33, 35 and, thus, it can be connected to them or the axes can be arranged between the carrying car 23 and the holding plate 21 (not shown.)

CLAIMS

1. A casting machine (1) with a device for controlling movement of a foundry ladle (9), comprising a control cam (33) with roller paths (29), on which the foundry ladle (9) is supported in a displaceable manner, and a lifting device for lifting the foundry ladle (9) prior to tilting and for lowering the foundry ladle (9) after emptying and for a refeeding with a new melt, characterized in that the foundry ladle (9) is suspended unilaterally and is supported pivotally around a vertically arranged axis (A) for movement from a casting position to an exchange position.

2. A casting machine according to claim 1, characterized in that the foundry ladle (9) and a carrying car (23) carrying the foundry ladle (9) and the control cam (33) is pivotally supported on the axis (A).

3. A casting machine according to claim 1, characterized in that the pivot axis (A) is arranged between a carrying car (23) and a holding plate (21).

4. A casting machine (1) having a device for controlling movement of a foundry ladle (9), comprising a control cam (33) with roller paths (29), on which the foundry ladle (9) is movably supported, and a lifting device for lifting the foundry ladle (9) prior to tilting and for lowering the foundry ladle (9) after emptying and for the refeeding with a new melt, characterized in that the foundry ladle (9) is suspended unilaterally from a carrying car (23), and two pairs of rollers (25, 27) are mounted on the carrying car (23), with an inner roller of each pair of rollers (25, 27) being supported and rolling on an interior roller path and an exterior roller being supported and rolling on an exterior roller path on the control cam (33).

5. A casting machine according to claim 4, characterized in that the control cams (33,35) comprise two roller paths (29, 31) each, which are positioned parallel to and offset from one another.

6. A casting machine according to claim 5, characterized in that at an upper roller path (29), subsequent to a linear upper section (41), one intermediate section (43) follows, which provides for a lowering and displacement movement for a spout (11) of the foundry ladle (9), which is tilted more than a subsequent section (47) for initiating a tilting motion for casting.

ABSTRACT

A casting machine (1) having a device for controlling a movement of the foundry ladle (9), and a control cam (33) having a roller path (29) on which the foundry ladle (9) is movably carried is provided. The casting machine further includes a lifting device for lifting the foundry ladle (9) prior to tilting and lowering of the foundry ladle (9) once it has been emptied for filling it with molten material. The foundry ladle (9) is mounted so as to swing about a vertical axis (A) from the casting position to an exchange position.